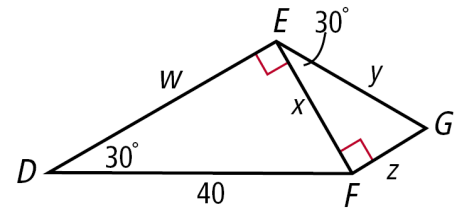
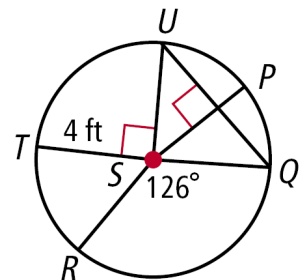


Attendance Problems

1. Find w , y , and z . Give the answers in simplest radical form.

**Find each measure.**2. \widehat{RT}

3. UQ



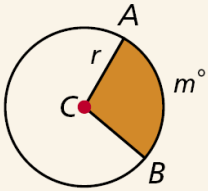
- I can find the area of sectors.
- I can find arc lengths.

Vocabulary

Sector of a circle	Segment of a circle	Arc length
--------------------	---------------------	------------

Common Core: CC.9-12.G.C.5 Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.

Sector of a Circle

TERM	NAME	DIAGRAM	AREA
A sector of a circle is a region bounded by two radii of the circle and their intercepted arc.	sector ACB		$A = \pi r^2 \left(\frac{m^\circ}{360^\circ} \right)$

The area of a sector is a fraction of the circle containing the sector. To find the area of a sector whose central angle measures m° , multiply the area of the circle by $\frac{m}{360}$.

Helpful Hint

Write the degree symbol after m in the formula to help you remember to use degree measure not arc length.

Question: What's the difference between the diameter and radius?

Answer: The radius!

"Appreciation can make a day--even change a life. Your willingness to put it into words is all that is necessary."—*Writer, Margaret Cousins*

1 Finding the Area of a Sector

Find the area of each sector. Give your answer in terms of π and rounded to the nearest hundredth.

A sector MPN

$$A = \pi r^2 \left(\frac{m^\circ}{360^\circ} \right)$$

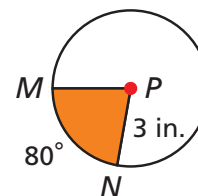
Use formula for area of a sector.

$$= \pi (3)^2 \left(\frac{80^\circ}{360^\circ} \right)$$

Substitute 3 for r and 80 for m .

$$= 2\pi \text{ in}^2 \approx 6.28 \text{ in}^2$$

Simplify.



B sector EFG

$$A = \pi r^2 \left(\frac{m^\circ}{360^\circ} \right)$$

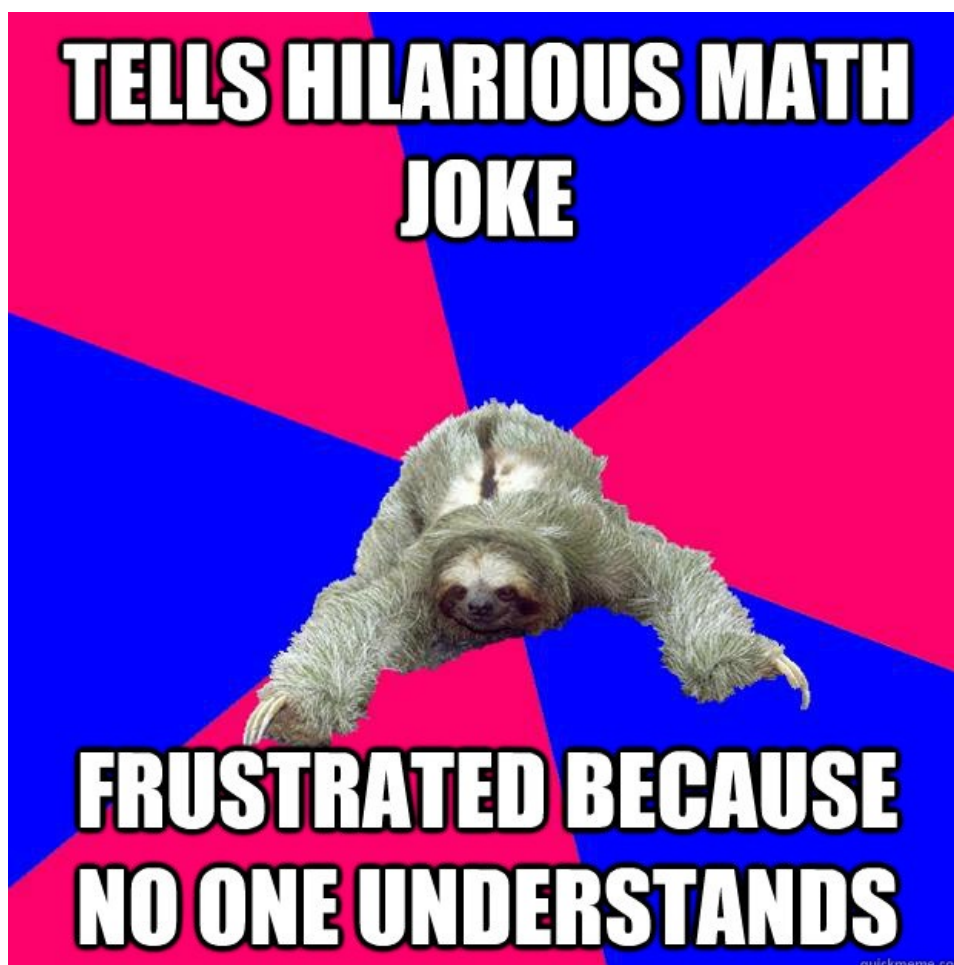
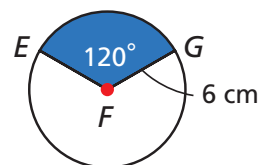
Use formula for area of a sector.

$$= \pi (6)^2 \left(\frac{120^\circ}{360^\circ} \right)$$

Substitute 6 for r and 120 for m .

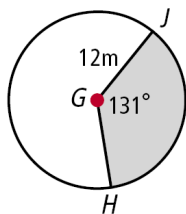
$$= 12\pi \approx 37.70 \text{ cm}^2$$

Simplify.

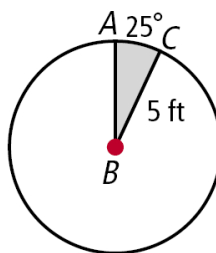


Example 1. Find the area of each sector. Give answers in terms of π and rounded to the nearest hundredth.

A. Sector HGJ

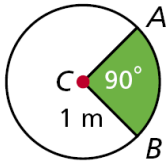


B. ABC

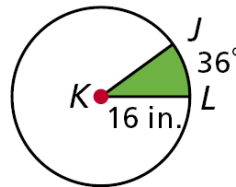


Guided Practice. Find the area of each sector. Give answers in terms of π and rounded to the nearest hundredth.

4.



5.



2 Agriculture Application

A circular plot with a 720 ft diameter is watered by a spray irrigation system. To the nearest square foot, what is the area that is watered as the sprinkler rotates through an angle of 50° ?

$$A = \pi r^2 \left(\frac{m^\circ}{360^\circ} \right)$$

$$= \pi (360)^2 \left(\frac{50^\circ}{360^\circ} \right) \quad d = 720 \text{ ft}, r = 360 \text{ ft.}$$

$$\approx 56,549 \text{ ft}^2 \quad \text{Simplify.}$$



Example 2. A windshield wiper blade is 18 inches long. To the nearest square inch, what is the area covered by the blade as it rotates through an angle of 122° ?

6. Guided Practice. To the nearest square foot, what is the area watered in Example 2 (Agricultural Application) as the sprinkler rotates through a semicircle?

A **segment of a circle** is a region bounded by an arc and its chord.

Area of a Segment



$$\text{area of segment} = \text{area of sector} - \text{area of triangle}$$

Remember!

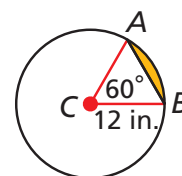
In a 30° - 60° - 90° triangle, the length of the leg opposite the 60° angle is $\sqrt{3}$ times the length of the shorter leg.

3 Finding the Area of a Segment

Find the area of segment ACB to the nearest hundredth.

Step 1 Find the area of sector ACB .

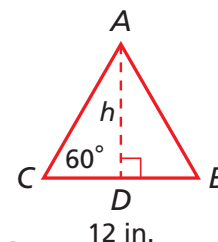
$$\begin{aligned} A &= \pi r^2 \left(\frac{m^\circ}{360^\circ} \right) && \text{Use formula for area of a sector.} \\ &= \pi (12)^2 \left(\frac{60^\circ}{360^\circ} \right) && \text{Substitute 12 for } r \text{ and 60 for } m. \\ &= 24\pi \text{ in}^2 \end{aligned}$$



Step 2 Find the area of $\triangle ACB$.

Draw altitude \overline{AD} .

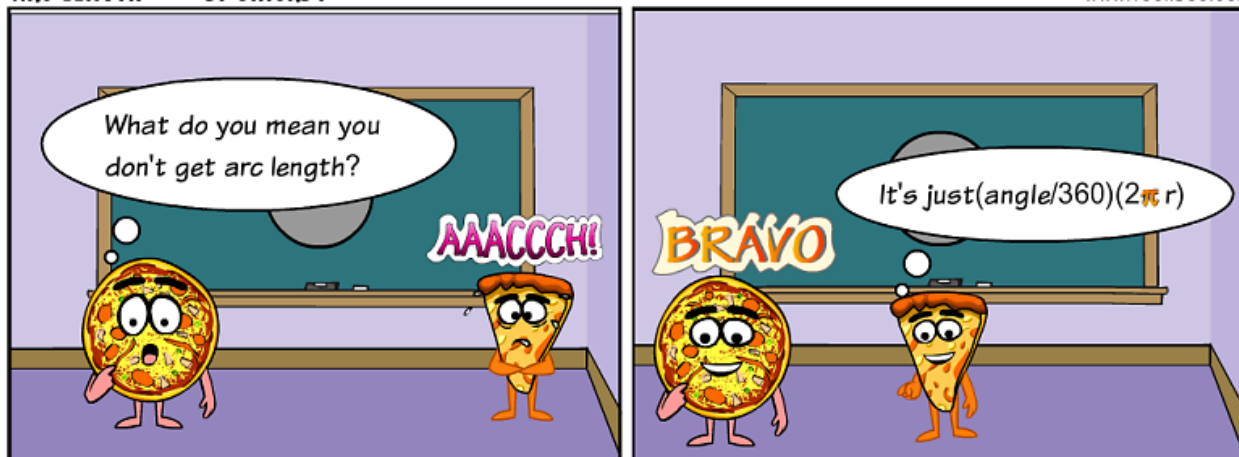
$$\begin{aligned} A &= \frac{1}{2}bh = \frac{1}{2}(12)(6\sqrt{3}) && CD = 6 \text{ in.}, \text{ and } h = 6\sqrt{3} \text{ in.} \\ &= 36\sqrt{3} \text{ in}^2 && \text{Simplify.} \end{aligned}$$



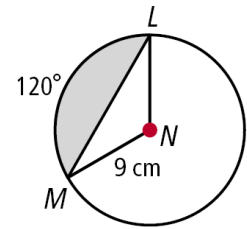
$$\begin{aligned} \text{Step 3 area of segment} &= \text{area of sector } ACB - \text{area of } \triangle ACB \\ &= 24\pi - 36\sqrt{3} \\ &\approx 13.04 \text{ in}^2 \end{aligned}$$

ARC LENGTH - BY JHICKS4

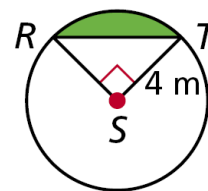
WWW.TOONDOO.COM



Example 3. Find the area of segment LM to the nearest hundredth.



7. Guided Practice. Find the area of segment RT to the nearest hundredth.



12-3 Sector Area & Arc Length: (p 813) 12, 13, 15, 17, 18

In the same way that the area of a sector is a fraction of the area of the circle, the length of an arc is a fraction of the circumference of the circle.

Arc Length

TERM	DIAGRAM	LENGTH
Arc length is the distance along an arc measured in linear units.		$L = 2\pi r \left(\frac{m^\circ}{360^\circ} \right)$

4 Finding Arc Length

Find each arc length. Give your answer in terms of π and rounded to the nearest hundredth.

A \widehat{CD}

$$L = 2\pi r \left(\frac{m^\circ}{360^\circ} \right)$$

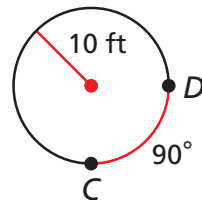
Use formula for arc length.

$$= 2\pi(10) \left(\frac{90^\circ}{360^\circ} \right)$$

Substitute 10 for r and 90 for m .

$$= 5\pi \text{ ft} \approx 15.71 \text{ ft}$$

Simplify.



B an arc with measure 35° in a circle with radius 3 in.

$$L = 2\pi r \left(\frac{m^\circ}{360^\circ} \right)$$

Use formula for arc length.

$$= 2\pi(3) \left(\frac{35^\circ}{360^\circ} \right)$$

Substitute 3 for r and 35 for m .

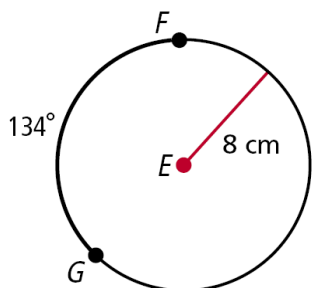
$$= \frac{7}{12} \text{ in.} \approx 1.83 \text{ in.}$$

Simplify.

Example 4. Find each arc length. Give answers in terms of π and rounded to the nearest hundredth.

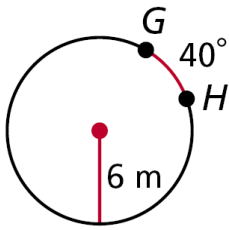
A. \widehat{FG}

B. An arc with measure 62° in a circle with radius 2 m.



Guided Practice. Find each arc length. Give your answer in terms of π and rounded to the nearest hundredth.

8.



9. An arc with measure 135° in a circle with radius 4 cm.

12-3 Sector Area & Arc Length

- (p 813) 12, 13, 15, 17, 18, 19, 21, 24.
- 12A Ready to Go On pretest & posttests.